

FY 2013 Region 1 Refuge I&M Proposal

Submitted by: Sue Thomas, Washington Maritime NWRC

Contact information: Sue_Thomas@fws.gov, 360.457.8451

Project title: Remote Photo Monitoring of Deer Activity in the Rhinoceros Auklet Colony on Protection Island NWR and quantification of seabird burrow damage.

Primary individual responsible for completing the project (name, title, contact information):
Sue Thomas, Wildlife Biologist, see above.

Project abstract: We request funds to assess frequency of use in, and subsequent damage to, seabird nesting habitat by deer on Protection Island NWR via infrared, remote photo monitoring. This project was developed to address the highest, most immediate management concern for the Refuge and directly supports the preferred alternative in the CCP: the “development of a step-down plan to remove deer from Protection Island.” It also directly addresses Research Objective 9.2 – “Conduct a pre- and post-deer removal assessment of impacts to seabird nesting habitats and other Refuge resources.” While deer removal was selected as the preferred alternative, the process will be described in a step-down management plan which will be subject to NEPA and public review. We expect some controversy with this management action because deer are a native species and the general public will likely vehemently oppose lethal removal from a Refuge. This project also supports 7 vegetative restoration objectives in the CCP; without deer removal, full-scale vegetative restoration will likely be unsuccessful particularly in forbs, their preferred browse. Also, the use of deer exclosures in the colony, in lieu of deer removal, can be fatal to nocturnal seabirds which cannot negotiate the exclosure wires.

This Refuge was established in 1982 with the purpose of protecting seabird nesting habitat, specifically for Rhinoceros Auklet. The island supports the third largest Rhinoceros Auklet nesting colony in North America with approximately 71,000 auklets (4.8% of the global population; Pearson et al. in press). However, a high-density herd (124 deer/mi²) of black-tailed deer are browsing and bedding down in auklet burrow nesting habitat. This has resulted in collapsed burrows, entrapment, and potentially reproductive failure for the Auklets.

A study conducted in 2010 (Balbag 2010) and 2012 (Refuge unpubl data) documented damaged auklet burrows in 85% of the n=80 5m x 5m plots surveyed throughout the colony; 19% of all burrows were damaged. The types of burrow damage documented included various types of burrow collapses and “punch throughs” that we strongly suspect were caused by deer. However, to date there is no definitive cause-and-effect evidence to link burrow damage to the deer, nor that the damage occurred during the auklet breeding season. Given the controversy surrounding removal of deer from the island, we need more definitive results to support the CCP objectives.

Due to the fragile nature of the substrate, human activity in the colony must be restricted. Remote photo monitoring will meet that need by reducing the potential for observer damage to the habitat and observer influence of deer behavior in the study sites. Therefore we propose to use a remote monitoring system incorporating both Wi-Fi-integrated and stand-alone cameras. These systems are highly effective in monitoring deer use due to and long-term development and use by the scientific community and deer hunters (Jacobson et al, 1997; P. Meyers, pers. comm.).

Results will provide baseline data for the development of a deer management plan and the adaptive management process for full-scale vegetative restoration, both geared toward protecting seabird

nesting habitat on the refuge. The protocol will include a statistically sound sampling plan and methods to analyze results briefly outlined below. It will be further refined based on field trials of camera monitoring systems, sampling intensity, and efficiencies identified during the project. The final product will include a revised protocol for inclusion in the I&M survey techniques tool box. Equipment purchased will directly support the CCP Research Objective 9.2 (listed above) and will be available for future resource monitoring projects at Region 1 refuges following this project's completion.

Funding Priorities (check all funding priorities that apply to the project):

<input checked="" type="checkbox"/>	Inventory Project/Collection of Baseline Data	<input checked="" type="checkbox"/>	Adaptive Management
<input checked="" type="checkbox"/>	Data Compilation and Management	<input checked="" type="checkbox"/>	Protocol Development
<input checked="" type="checkbox"/>	Purchase of Equipment	<input checked="" type="checkbox"/>	Evaluate effects of environmental stressors, incl. climate change
<input type="checkbox"/>	Leveraging existing programs supporting surveys on refuges.		

Project objective(s):

1. Conduct pre- vs. post- breeding season burrow damage surveys.
2. Correlate deer activity within these plots to document presence, behavior, and usage rates (e.g., # visits, time of day) during the auklet breeding season.
3. Provide data to inform development of a deer management plan for Protection Island NWR, as well as photographs for use in presenting the issue to the general public.

Describe how project deliverable(s) will be used by the refuge staff for decision making: During development of the CCP, refuge managers stated the need for a study to definitively show the connection between deer activity and auklet burrow damage. This proposal seeks to meet that need. Data collected will include frequency of deer use of auklet nesting habitat correlated with a quantitative assessment of damage to burrows during the breeding season. In addition, the study will provide us with direct, visual evidence of damage caused by deer which will be invaluable in helping present the issue to the general public.

Methods: We will deploy n=15 trail cameras at up to 30 burrow-damage plots. Plots will be geographically stratified so that they are distributed throughout the entire auklet colony, as well as to obtain equal coverage across steep ($>25^\circ$) vs. gradual ($\leq 25^\circ$) slopes. This will preserve continuity of data with the previous study which documented greater burrow damage in areas with gradual slopes.

We will use 2 different trail camera systems. We will deploy n=10 WiFi-enabled cameras (BuckEye Cam© or equivalent) across areas where there is access to unobstructed line-of-sight to a remote base station. This system will greatly enhance operational logistics by allowing frequent image downloading & processing, as well as potential trouble-shooting if cameras fail or are disturbed. We will also deploy n=5 stand-alone cameras (Reconyx© or equivalent) in locations where the WiFi system cannot operate. All trail cameras will use a passive infrared (IR) triggering device and a short-wavelength IR flash (No Glow) to capture nighttime images without disturbing the auklets or deer.

To minimize human disturbance and strong potential for human-caused damage to burrows, trail cameras will be deployed prior to the auklet nesting season (1 May), and then re-deployed mid-way through the nesting season (approx. 1 Jul). This will result in approx. 60-day monitoring periods for each plot. However, all stand-alone cameras will be re-visited within 1 week of deployment to ensure camera functioning. Plot size will be determined during field tests prior to the auklet nesting season (based on the most effective viewing area for the camera lens), but initially will be either 5m x 5m (used in the previous burrow-damage study) or 5m x 10m (to increase documentation of deer activity with each plot). Plot corners will be marked so that the plot boundary can be determined in the camera images and that the plot can be accurately re-surveyed.

We will survey each plot twice during 2013 for auklet burrow damage: just prior to and again immediately following the auklet nesting season (1 May – 1 Sep). Data recorded will include # burrows, # damaged burrows, type of damage (entrance, tunnel, nest chamber), and general plot information (slope, aspect, vegetative cover, GPS plot corners). Scaled, close-up digital photographs will be taken of each burrow, and referenced on a full-plot image (or other plot map).

Trail camera images will be processed to assess deer activity based on each image's date/time stamp. Summary metrics will include deer presence/absence, minimum # deer using the plot, types of deer activity (e.g., walking, foraging, bedding/loafing), and timing of peak activity. If a volunteer is available, photo processing will occur regularly (e.g., each week) for the WiFi-enabled cameras; stand-alone camera images will be processed after each 60-day monitoring period. We expect to use 1 or 2 students from Peninsula College and/or Puget Sound University for a total of 80 person days.

After the field season, the PI will QA/QC results and analyze them in coordination with the I&M Zone Biologist. The PI will archive all photographs on an external hard drive with relevant photographs provided to I&M Zone Biologist and interested Regional Office staff.

Describe any statistical assistance, GIS, or database support needed: Assistance will be needed from the I&M program for statistical analysis. The Refuge Information Branch will provide additional support for Trimble GPS data collection, GIS database design, processing, and mapping.

Project implementation timeline, including schedules for field/lab/office work, data management (entry, QA/QC, analyses, archiving), and deliverables (e.g., progress/final reports, potential peer-reviewed publications):

February - April: PI and I&M Zone Biologist finalize sampling design and protocol. If funding is available prior to nest initiation, PI purchases camera systems and tests deployment to assure that they primarily capture activity of deer. PI also begins process to recruit a volunteer.

May – September: PI deploys and manages camera systems. See methods above for further detail.

September – October: Majority of photographs are processed and QA/QC'd by PI. PI and I&M Zone Biologist analyze results. PI archives and provides all relevant photographs to the I&M Zone Biologist and interested Regional Office staff. Final, revised protocol and progress report summarizing field activities presented to I&M Program by September 31, 2013. Draft final report presented to I&M Program for comments and questions by October 31, 2013.

December: Final report (incl. databases) addressing comments and questions due to I&M Program by December 31, 2013. Deer Management Plan development initiated based on results.

Project completion date (and mid-completion date, if project extends into FY2014):

Mid Completion Date (progress report and final protocol): September 31, 2013

Project Completion Date (final report): December 31, 2013

1. Planning Connection: This project directly addresses the two top priority biological objectives of the Protection Island/San Juan Islands CCP:

- a. Conduct a pre- and post- deer removal assessment of impacts to seabird nesting habitats and other Refuge resources (CCP Objective 9.2).
- b. Coordinate with WDFW and the Point No Point Treaty Tribes in the development of a step-down plan to remove deer from Protection Island (CCP Objectives 1.1, 2.1, 2.2, 3.1, 4.1).

Indirectly, this project supports 7 restoration objectives (CCP Objectives 1.1, 2.1, 2.2, 3.1, 4.1, 9.2, and 9.3). Deer populations will thrive with an increase in abundance of forage as will be the case with intensive revegetation efforts planned for the island.

2. Large Investment in Management Actions: This project is the first step in a multi-year, multi-faceted, adaptive management approach to restoring Protection Island beyond the life-span of the current CCP. Complex staff expect to spend approximately 20 to 40% of our time, annually, on restoration, management and biological program efforts throughout the timespan of this project.

3. Partners: This project engages 3 partners including WDFW, which co-owns the island and conducts additional Auklet research (Pearson et al. in press); researchers from Puget Sound University who assisted with auklet research and conducted the first study of deer use in the colony (Balbag 2010); and 1 or 2 students from a local college as volunteer(s) to process photographs.

4. Controversy: This project will provide management with sound science to address the highest management controversy in the CCP. While deer removal was selected as the preferred alternative in the CCP, the full process was not described and the management plan will be subject to NEPA and public review. Deer removal will be a controversial issue during public input. In addition, WDFW and Point No Point Treaty Tribes, partners we must engage in writing the management plan, will likely disagree over removal and maintenance options.

5. National I&M Priority: This project addresses two I&M Program priorities (BIM and AM). Specifically, it will provide “scientifically creditable data used to ensure actions are robust to existing uncertainties and that monitoring programs are targeted to reduce key uncertainties” (BIM) and “provide each refuge with access to the necessary resources to fully implement ...adaptive management” and “integrate I&M with resource management decisions on individual refuges” (AM).

6. Project Design: See Methods and Implementation Timeline above.

7. Data Management (Complete the next section)

8. Continuity: This project will build upon a burrow damage study conducted in 2010 (Balbag 2010) and 2012 (Refuge unpubl. data), with the combined results providing support for the Protection Island NWR deer management plan and revegetation efforts.

9. Other Evaluation Criteria: This project is significant to the Refuge because it represents the necessary first step toward full-scale restoration of Protection Island NWR. Given the very specific purpose statement for this refuge, protection of breeding seabird habitat (see Project Abstract) is our highest priority, yet removal of deer will be controversial with the public.

Data Management Plan:

- **Description** - Document frequency of use by deer and subsequent damage to auklet burrows during the breeding season on Protection Island NWR.

- **Data Management Budget** – Approximately 40% (\$8,830.00) of the total budget will be spent toward data management including 100% of volunteer time used to process photos and enter/archive tabular data as well as \$2,030 to buy memory cards and a laptop to both serve as the base unit for remote cameras as well as store and process photos in the field. In addition, approximately 120 hrs of in-kind support will be provided through the PI's time spent writing data descriptions (see metadata), QAQC and reporting.
- **Format** – Photographs will be maintained in .jpg format; frequency and intensity of damage/plot will be characterized, maintained, and cross referenced with photos of damage in an Excel database; location of plots will be maintained in a GIS database. All data will be backed up on an external hard drive and uploaded onto ServCat.
- **Data Processing and Workflows** – PI deploys units and photographs damage prior to monitoring; locates coordinates of plot with Trimble unit; tests placement and effectiveness of remote sensors within first two days of deployment. Volunteer processes photographs remotely during the field season or in office after field season. PI QA/QCs results (see Quality Checks below); enters location data from Trimble in GIS database; archives photographs.
- **Quality Checks** – Real time monitoring and processing will provide for the highest quality data. PI will deploy all camera stations, assure that past damage is photo documented, remove stations and ensure that new damage is properly photographed and characterized. The PI will monitor the project throughout to assure that all new damage is correctly linked to photographs.
- **Back-up and Storage** – All data will be backed up on an external hard drive regularly during the data capture/processing phase of the project. Final data (e.g., photos, spreadsheet, and geodatabase) will be uploaded to ServCat.
- **Metadata** - The final report will include a description of the sampling design, methods, and equipment used. The report will also describe photo naming conventions and management system. A data dictionary will be included as a worksheet in Excel to describe the data column, formats and acceptable values (e.g., Damage type = "entrance," "punch-through", "none detected."). Metadata for the geodatabase will be entered using ArcCatalog and comply with FGDC standards.
- **Restrictions** – No known restrictions
- **Contact** – Sue Thomas, Wildlife Biologist, WMNWRC, see contact info 1st pg.

Item	FY13	FY14
Contracts	-	
Materials/Equipment	15,309.00	
FWS Personnel Costs	-	
Other: Vol. Stipend @85/day for 80 person days	6,800.00	
FY TOTAL(S)	\$22,109.00	

Literature Cited:

Balbag, B. 2010. The impact of deer on the rhinoceros auklet (*Cerorhinca monocerata*) breeding colony on Protection Island, WA. Unpubl. Sr. thesis, University of Puget Sound, Tacoma, WA. 34pp.

Jacobson, H.A., J.C. Kroll, R.W. Browning, B.H. Koerth and M.H. Conway. 1997. Infrared-triggered cameras for censusing white-tailed deer. Wildlife Society Bulletin 25: 547-556.

Pearson, S.F., P.J. Hodum, T.P. Good, M. Schrimpf, and S.M. Knapp. In Press. Breeding population changes and habitat characteristics of Rhinoceros Auklet (*Cerorhinca monocerata*) colonies in human-influenced, non-upwelling and open coast systems. Pacific Seabirds.